Compound Separation

Liquid-liquid extraction is a term used in chemical laboratory work to describe a method of separating various chemical compounds contained within biological liquids, such as blood or urine samples. Used for such purposes as medical treatment, pharmaceutical preparation, and forensic chemistry, extraction is a process whereby the compounds to be separated are transferred to a solvent liquid in a series of complicated, time-consuming steps requiring a variety of special equipment.

Looking for a simpler, easier way to separate compounds, Jet Propulsion Laboratory (JPL) developed a new one-step liquid-liquid extraction technique which sharply cuts processing time, reduces costs, and eliminates much of the equipment requirement. The technique employs disposable "extraction columns," or tubes, partially filled with an inert, water-absorbent granular matrix. Shown in the accompanying photos, these columns are now produced commercially by Analytichem International, Inc., Harbor City, California under the trade name Extube®.

In a typical extraction, a liquid sample is poured into an Extube where the filling material absorbs water and





impurities from the sample and spreads the specimen as a very thin film over a large area. To extract a particular compound, an appropriate liquid solvent is introduced to the tube. As the solvent passes through the filling material, the desired compound becomes dissolved in the solvent and exits through the tube's nozzle. A different compound may be extracted from the remaining sample by introducing another solvent. The upper photo on the opposite page shows extraction solvent being delivered from a dispenser to a type of Extube known as Tox Elut[®], used for detection of drugs in a sample. At bottom left is another member of the Extube family called Clin Elut[®], more highly purified than Tox Elut and employed

in more sensitive analytical procedures. Below is a group of larger Chem Tube[®] columns, used for large volume applications in industrial and environmental analysis.

JPL's original development was undertaken as an aid to the Los Angeles Police Department, allowing more rapid detection of drugs in biological samples as part of the department's drug abuse program. NASA waived title to the invention to the California Institute of Technology (Caltech), JPL's parent organization, and Analytichem International is producing Extubes under Caltech license.

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